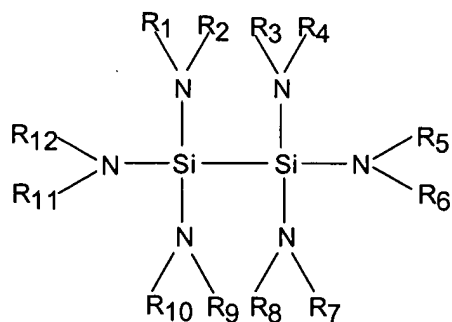


THE CLAIMS

What is claimed is:

1. A silicon compound comprising a disilane derivative that is fully substituted with alkylamino and/or dialkylamino functional groups.
2. The silicon compound of claim 1, characterized by two or more alkylamino and/or dialkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
3. The silicon compound of claim 1, characterized by two or more alkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
4. The silicon compound of claim 1, characterized by two or more dialkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
5. The silicon compound of claim 1, characterized by a melting temperature of less than 100°C.
6. The silicon compound of claim 1, characterized by a vaporization temperature of less than 300°C.
7. A silicon compound having the formula:

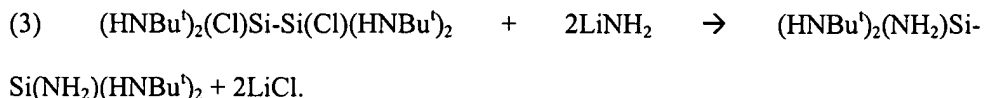
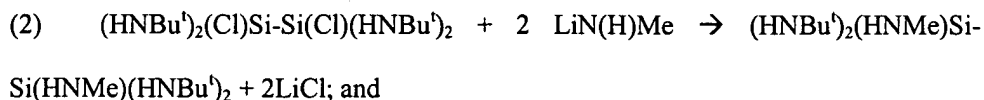


wherein:

R₁-R₁₂ may be the same as or different from one another and each is independently selected from the group consisting of H, C₁-C₅ alkyl, and C₃-C₆ cycloalkyl.

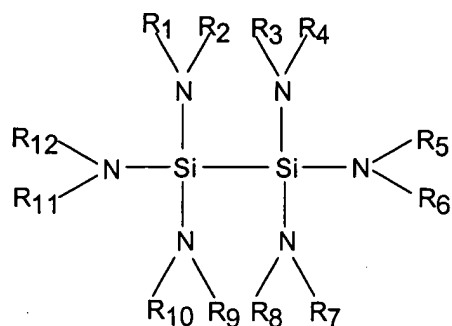
8. The silicon compound of claim 7, characterized by two or more alkylamino and/or dialkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
9. The silicon compound of claim 7, characterized by two or more alkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
10. The silicon compound of claim 7, characterized by two or more dialkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
11. The silicon compound of claim 7, characterized by a melting temperature of less than 100°C.
12. The silicon compound of claim 7, characterized by a vaporization temperature of less than 300°C.
13. A silicon compound selected from the group consisting of (NEt₂)₂(HNMe)Si-Si(HNMe)(NEt₂)₂, (HNBu^t)₂(HNMe)Si-Si(HNMe)(HNBu^t)₂, and (HNBu^t)₂(NH₂)Si-Si(NH₂)(HNBu^t)₂.
14. A method for forming a silicon compound as in claim 13, comprising one of the following reactions:

(1) (NEt₂)₂(Cl)Si-Si(Cl)(NEt₂)₂ + excess H₂NMe → (NEt₂)₂(HNMe)Si-Si(HNMe)(NEt₂)₂ + 2H₂NMe·HCl;



15. A method of forming a silicon-containing film on a substrate, comprising contacting a substrate under chemical vapor deposition conditions with a vapor of a silicon compound as in claim 1.
16. A method of forming a silicon-containing film on a substrate, comprising contacting a substrate under chemical vapor deposition conditions with a vapor of a silicon compound as in claim 7.
17. A method of forming a silicon-containing film on a substrate, comprising contacting a substrate under chemical vapor deposition conditions with a vapor of a silicon compound as in claim 13.
18. A composition for chemical vapor deposition of a silicon-containing film on a substrate, said composition comprising (i) one or more disilane derivatives that are fully substituted with alkylamino and/or dialkylamino functional groups and (ii) one or more hydrocarbon solvents.
19. The composition of claim 18, wherein said hydrocarbon solvents comprise HN^iPr_2 .
20. The composition of claim 18, comprising at least two disilane derivatives.
21. A composition for chemical vapor deposition of a silicon-containing film on a substrate, said composition comprising:

- (a) one or more silicon compounds having the formula:



wherein:

R_1 - R_{12} may be the same as or different from one another and each is independently selected from the group consisting of H, C_1 - C_5 alkyl, and C_3 - C_6 cycloalkyl; and

- (b) one or more hydrocarbon solvents.
22. The composition of claim 21, wherein said hydrocarbon solvents comprise HN^iPr_2 .
23. The composition of claim 21, comprising at least two disilane derivatives.
24. A method of forming a silicon-containing film on a substrate, comprising the steps of:
- providing a composition as in claim 18;
 - vaporizing said composition to form a precursor vapor; and
 - contacting the substrate under chemical vapor deposition conditions with said precursor vapor to form said silicon-containing film.
25. The method of claim 24, wherein said composition is vaporized at a temperature that is not higher than 300°C.
26. The method of claim 24, wherein said composition is vaporized at a temperature that is not higher than 150°C.

27. The method of claim 24, wherein said silicon-containing film comprises silicon nitride.
28. A method of forming a silicon-containing film on a substrate, comprising the steps of:
 - (a) providing a composition as in claim 21;
 - (b) vaporizing said composition to form a precursor vapor; and
 - (c) contacting the substrate under chemical vapor deposition conditions with said precursor vapor to form said silicon-containing film.
29. The method of claim 28, wherein said composition is vaporized at a temperature that is not higher than 300°C.
30. The method of claim 28, wherein said composition is vaporized at a temperature that is not higher than 150°C.
31. The method of claim 28, wherein said silicon-containing film comprises silicon nitride.